Vital Signs Town Hall Teleconference
Working Together to Stop Multistate Foodborne Outbreaks
November 10, 2015
1:00 pm CT

Coordinator: Welcome and thank you all for standing by. At this time, all parties are in a listen only mode until today's question and answer session. At that time, you may press star one on your phone to ask a question. I would like to inform all parties that today's conference is being recorded and if for any reason you object to that you may disconnect at this time. I will now hand the conference over to Dr. Dan Baden. Dr. Baden you may begin.

Dan Baden: Thank you Sydney. Good afternoon everyone. As Sydney said I'm Dr. Dan Baden, Senior Medical Advisor in CDC's Office for State, Tribal, Local and Territorial Support. Sorry for the delay.

We had a surge of people trying to join right at two o'clock and we wanted to wait to try and get as many of them into the call as possible. I'm glad you could join us today. We'll be discussing the latest *Vital Signs* report on multistate foodborne outbreaks. Before we get started, let's go over some housekeeping details.

You can go online and download today's PowerPoint presentation so you can follow along with the presenters. The web address is www.cdc.gov/stltpublichealth. That's S-T-L-T public health. Look on the far right side of the page for the *Vital Signs* teleconferences link or you can Google CDC *Vital Signs* town hall and click on the top link. That should get you there.

On the same page you can access bios for today's presenters and the audio recording and transcript should be available there next week. There will be time for questions after today's presentations but you can get into the queue at any time. Just press star one and say your name when prompted.

Back to our topic for today, working together to stop multistate foodborne outbreaks. We're going to hear from three colleagues. First we'll hear from Dr. Ian Williams, the Chief of the Outbreak Prevention and Response Branch in the Division of Foodborne, Waterborne and Environmental Diseases at CDC's National Center for Emerging and Zoonotic Infectious Diseases.

He will talk about the findings from this month's *Vital Signs* report. Then Dr. Tim Jones will present. He is the state epidemiologist for the Tennessee Department of Health. He will discuss the state health department's perspective on how safer food saves lives and then hand the call over to Dr. Michael Doyle, the Director of the Center for Food Safety at the University of Georgia. He will talk about the PulseNet driven investigations.

And then during our discussion, we'll have two more participants, Dr. Kathleen Gensheimer, the Chief Medical Officer and Director of the Coordinated Outbreak Response and Evaluation Network, CORE, at FDA's Office of Food and Veterinary Medicine and Dr. David Goldman, the Assistant Administrator in the Office of Public Health Science at USDA's Food, Safety and Inspection Service. And now, I'll turn the call over to Dr. Williams.

Ian Williams: Good afternoon and thanks for inviting me to talk about CDC's *Vital Signs* report, Safer Food Saves Lives. In this presentation, I will briefly describe the findings of this *Vital Signs* report and how food industries and government

can work together to stop outbreaks and make food safer. Next slide and you should all be on slide five to follow along with me.

Contaminated food sent to several states can make people sick with the same germ. Foods that cause multistate outbreaks are those which are contaminated before they reach a restaurant or home kitchen. Investigating these outbreaks often reveals problems on the farm in processing or distribution resulting in contaminated food. Lessons learned from these outbreaks are helping make food safety - safer.

So at CDC, our objective as we set out to do the work that I'm describing to you today was to highlight actions food industry and government at all levels can take to stop outbreaks and keep them from happening in the first place.

Multistate foodborne disease outbreaks are serious and hard to solve. We should be on slide six by the way. They can be hard to detect and to investigate and they can be hard to trace contaminated food to the source.

Multistate outbreaks can be hard to detect because contaminated food grown or produced in a single place can wind up in kitchens across America. People in many states may get sick making it difficult to spot the outbreak in the first place. And detection requires specialized testing of germs in laboratories across the country. Next slide please. We should be on slide seven.

Multistate outbreaks can be hard to investigate because investigators depend on sick people to remember what they ate several weeks earlier. If the problem is a contaminated ingredient, people may unknowingly eat it in many different foods. And unexpected foods have been linked to recent multistate outbreaks such as things like chia powder and caramel apples. Next slide.

Contaminated food can be hard to trace to the source because companies may not have complete records of the source or destinations of their foods. Imported foods can be even harder to trace to its source and imports have been increasing recently. Many farms may have - may produce - many farms may produce the beef in a single burger or the fresh vegetables sold in a single crate. Next slide please. We should be on slide nine.

However, innovative methods are helping to detect and solve more multistate outbreaks. These include new DNA sequencing technology which is improving our ability to link germs found in sick people and contaminated foods. Information technology is also helping investigators in many places work together.

Efforts by food industry are also helping trace contaminated foods to their source. In recent years, more multistate outbreaks are being found as shown on this slide. From 34 during 1995–1999 to 51 during 2000–2004 to 79 during 2005–2009 and in the last period study during 2010–2014 there were 120 multistate outbreaks reported to the foodborne disease outbreak surveillance system at CDC. An average of 24 outbreaks occurred each year in this period. The median number of states involved with each outbreak was six with a range of 2 to 37. Next slide please.

Even though multistate outbreaks are less common, accounting for only 3% of all US foodborne outbreaks they are more serious. They account for 11% of sickness, 34% of hospitalization and 56% of deaths. This is because the deadly germs *Salmonella*, *E. coli*, and *Listeria* cause 91% of these multistate outbreaks. Next slide. You should be on slide 11 now.

So what can be done about these outbreaks? We believe that food industries, governments, healthcare providers, and consumers all play a part in working together to stop outbreaks and make food safer.

Specifically, food industries can keep records to help trace food, use store loyalty cards and distribution records to identify what sick people ate, recall products linked to an outbreak and notify customers, choose only suppliers that use food safety best practices, share proven food safety solutions with others in industry, make food safety part of the company culture and meet or exceed new food safety regulations. These steps are important since almost half of multistate foodborne outbreaks result in product recalls.

The federal government agencies can help implement improved safety laws and regulations, work with state and local health departments to use better methods to find and investigate outbreaks and improve food safety inspections and guidelines. State and local public health agencies play an important role by encouraging clinical labs to send germs to public health labs for advanced testing, testing these germs from sick people quickly then interviewing the sick people promptly, testing suspected foods if they're identified and available, and participating in national networks to share and improve investigative methods. Next slide. You should be on slide 13 now.

Healthcare providers can help by submitting patient samples quickly to their public health laboratories, reporting suspected public - reporting suspected outbreaks, and informing patients of those in high risk groups that they have an increased risk of food poisoning.

Finally, everyone can check for food recalls and info on how to handle food safely, taking action if you think you have a foodborne illness, assisting your public health investigators by answering questions if they contact you and

finally consider getting a loyalty card where you shop to assist with trace back information. So we're now on slide 14, next slide.

In summary, multistate foodborne outbreaks are serious and hard to solve. Investigating these outbreaks often reveals problems on the farm during processing and distribution. However, lessons we are learning from these outbreaks are helping make food safer. Government at all levels in food industry need to work together to stop outbreaks and keep them from happening in the first place.

We believe that by working together, we can make food safer and save lives. Last slide, slide 15. I'd like to thank you for your attention today and I would like to now turn it over to Dr. Tim Jones who is the state epidemiologist for the Tennessee Department of Health.

Tim Jones: Thanks Ian. If folks would like to move to slide 17 it just shows sort of a pyramid of foodborne illness and it's to make the point that all or a great number of the germs that cause foodborne illness are required to be reported to health departments at the local and state level.

But we know that potentially each of those individual reports really only represents the tip of the iceberg about of what's going on out in the communities and this pyramid sort of demonstrates the fact that, you know, all of us eat and many of us can be exposed to potentially contaminated foods.

But only a relatively small proportion of us will actually become ill and only a very small percentage of us would then go to the doctor or get a stool culture. And it's the few of us that have a positive stool culture that then gets reported to the state health department. And, you know, estimates vary but, you know, it may be that up to 1 out of 30 or so cases are all that we hear about. So each

of these cases that get reported to us we have to take very, very seriously to ensure that they are not sort of the sentinel event for a larger outbreak that needs more vigorous investigation.

So if you move to slide 18, it just shows a bar graph of outbreaks per million population per year over the last several years by state. And they're randomly ordered but you'll see that there is a huge variation, up to an 80-fold difference, in the number of foodborne outbreaks per capita among states across the country.

And I really don't think that this is because we cook more or less safely at different parts of the country but really it just represents the wide variability in the resources and infrastructure that are available in states to detect and then investigate outbreaks. And this is something that really deserves a lot of attention and is part of the topic today.

You will also note as Dr. Williams said that, you know, there are several hundred outbreaks reported nationally each year and only 20 or 30 of those are multistate outbreaks. But they tend to consume a lot of our attention and disproportionately take a lot of that time and effort we put into these investigations.

So if you go to slide 19 it sort of shows - it's one example of how successful we are and we have room to improve. This just shows that in only a minority of 42% of outbreaks do we even really identify the vehicle or the food that was responsible for transmitting the infection. In a third of cases we don't even know what the germ is. So I think as we build up resources and skills in states we can do a much better job of finding the source and ultimately stopping it and preventing future illnesses.

So if you go to slide 20 which is - describes outbreak - the outbreak investigation process and some of the steps. Probably the most important are the first and last bullets and the first is that we have to detect it. We have to go through this laborious surveillance process in order to recognize that there's an outbreak out there.

And until we do that, we can't really do anything about it. And I think this is probably one of the steps that has led to the wide variability across states and how many we report. Then there's sort of a logical process we go through. We have to confirm the illnesses. That involves doing interviews and laboratory testing.

Something about those initial interviews has to give us some clues and allow us to develop a hypothesis and then we move into more scientific steps like doing case control studies, ultimately identifying the food and getting it off the market.

But the last step of intervention and control is not something that we do at the end of an investigation. Our job, as public health servants, is to stop the outbreak as fast as we can and sometimes that means we will do a trace back or do an announcement about a food or close an establishment before we have all of the other scientific questions answered just because we have to err on the side of safety to prevent ongoing illnesses while we're sorting out a lot of the additional information.

I think a recent example here in Tennessee of that involved an outbreak of *E. coli* 0157, which is a pretty serious bug. And we saw several outbreaks in institutional settings particularly schools here. But two other states were affected including a long term care facility and there were at least two deaths. And, you know, had we not recognized the initial school outbreak and quickly

identified the lettuce that was implicated and gotten that information into a national database of a laboratory network, which you'll hear about in a few minutes, it never - we never would have recognized it. It was a multistate outbreak and wouldn't have been able to initiate the trace back and mitigation.

And that sort of brings up the point that it's really, really important not only for states to be off doing this by ourselves but to have mechanisms for communicating with other states and working closely with CDC and other federal agencies like USDA and the FDA.

The next slide, slide 21, just shows some pictures of laboratory techniques and sort of the traditional techniques of bacterial culture or growing organisms in a laboratory in order to be able to do the rest of our science. If you move forward to the next slide, 22 though, it brings up the point that laboratory technology is moving ahead very, very quickly and traditional culture or growing of the organisms is becoming more and more rare.

And it's being replaced by what we call non-culture diagnostics or advanced molecular diagnostics. And there are pluses and minuses about these types of testing. We can talk about that later but one of the things that we're seeing is that we're finding a lot more than we ever knew about before.

And it may be that up to 2/3 of the time we find germs that the doctor wasn't even thinking about when they sent the specimen to be tested. So there are many new challenges facing us with the advancement of technology and it's something that's great affecting the way we do these outbreaks.

If you move forward to slide 23, this just shows the number of organisms that are being submitted to the PulseNet network. I won't talk much about that because I think it's coming up in the next session. So then if you move to slide

24, challenges in investigations, we are seeing lots and lots of new food vehicles.

So this means things like pepper and peanut butter and ingredients in foods that never were on our list of suspects before. We're starting to see a large proportion of multistate outbreaks being attributable to products that we never thought or had never seen cause outbreaks before.

Standardizing questionnaires it can be really hard to get states on the same page and all using the same tools. We all think we have good ones and so sharing is really, really important but that's getting a lot better.

Multi-agency communication. I mentioned, the laboratory environment and epidemiology sides are all really, really important when we're doing these outbreaks. Tracing back foods from sort of where the fork was put in the mouth back to the farm or the establishment where the problem happened is incredibly work intensive and we can only really ask for that work to be done once there is really strong epidemiology to support it.

And then as I mentioned early on, there are always competing resources and lots of other emergencies going on. And unfortunately we sort of have to balance things out and make a priority list.

So my last slide, 25, moving forward there are lots of things that I think are good harbingers for getting - improving as we move forward. I mentioned that advances in molecular diagnostics I think will open new realms of investigation. Cross agency collaborations have really, really improved in the last few years and I think that's demonstrated by the number of agencies we have here on the call. There are lots of opportunities for training both on the epi lab and environmental side across the country.

And then CDC and other agencies have really done a lot to establish some very strong programs in multiple states and there are - include things like establishing centers of excellence for foodborne disease, Food Core, C4, Counsel for Improving Foodborne Outbreak and Response and a host of others all of which get many partners to the table to work together to help support these investigations. So with that, I will introduce Dr. Michael Doyle. He's the regents professor and Director of the Center for Food Safety at University of Georgia.

Michael Doyle: Thank you Dr. Jones. Good afternoon. I'm going to focus on the PulseNet which is a core surveillance tool of the CDC and the state and local health departments that help detect multistate - the multistate outbreaks that have been discussed earlier. Basically the PulseNet receives information from the state and local health departments that is from the germs that are isolated from infected people.

And the state and health or the health departments actually fingerprint by molecular tools these isolates. This information is then fed into a central database at the CDC and all of the state and local health departments will then have access to this information and can see if there's common isolates in the system that might represent an outbreak. Next slide please, 27.

And so as was indicated earlier, we're seeing major advances occurring with the PulseNet. And one of the primary advances is the use of whole genome sequencing instead of the old traditional house field gel electrophoresis molecular subtyping techniques. We've got better, more sophisticated techniques that will help improve our ability to link these germs that are found in the sick people to the contaminated foods. In addition, there have been

advances in information technology and this is now helping the investigators in many places to work together. Next slide please, slide 28.

So we now have basically a new generation of foodborne disease detection where we're combining the results of the whole genome sequencing with detailed interviews of each of the ill individuals. And we're learning that this is giving us quicker results and enabling us to source track or trace back to the cause of the illness, the source of the problem. We can do this much quicker now. It's shortening the time to detection of outbreaks and tracing back to the food.

And we can now even isolate bacteria at retail from a grocery store, for example, food from a grocery store, do the whole genome sequencing on that sample, have a whole genome sequence that's in our PulseNet database from infected people, and compare those whole genome sequences and make a link.

And we can also largely through our FDA go into food processing plants and isolate bacteria from implicated processors and do the whole genome sequence of those germs and make the puzzle one complete part. And so, we're able to go all the way from the retail outlet and get a sample of food and link it to a food processing facility.

To give you a good example, there's been a lot of press about the Blue Bell Ice Cream *Listeria* outbreak. And what happened in this particular situation was the state of Carolina Department of Public Health isolated *Listeria monocytogenes* from an ice cream sample.

The whole genome sequence was done on that particular isolate. It was submitted to the database at PulseNet and it matched with some *Listeria* strains in the PulseNet database. And so investigators then went in and

interviewed patients that were hospitalized at a particular hospital in Kansas and they reviewed the hospital kitchen records and there was a link to Blue Bell Ice Cream. And I want to emphasize just because we make this link with whole genome sequencing, we still have to do these interviews and do the epidemiology to make that more definite connection. Slide 30 please.

So we're seeing that there's an ability now to connect the whole genome sequence results in the PulseNet database with Blue Bell Ice Cream and not only with the patients that were in this hospital but CDC was able to go back and find additional cases, a total of 10 *Listeria* cases, that in one case dated all the way back to 2010.

FDA through its work was able to find *Listeria monocytogenes* in the Blue Bell Ice Cream processing facilities and with their whole genome sequencing found that these isolates also matched some of the patient isolates. And so there was a full link from the original sample to the patients to the processing facility.

Now I want to give you some examples. PulseNet has been in existence now 20 years. And there's been a lot of revelations that have occurred as a result of these outbreak investigations. And as Dr. Jones indicated, many foods that had not previously been identified as vehicles of foodborne outbreaks have now been revealed as vehicles.

And I want to give you some examples. And the good news from my perspective is that when these types of foods are identified, processors will look at this as often a new problem for them because it's - hadn't been identified before and they'll take corrective action which is applied industry-wide.

And one of the first examples that I have here on slide 32 is peanut butter. There was a peanut butter outbreak in which there were 425 cases of salmonellosis. And this was the first time peanut butter had been recognized as a vehicle of foodborne illness in the United States.

And this led to the company that was implicated to essentially rebuilding that entire plant which is now I believe the state of the art facility for processing peanut butter. And it led the industry to validate their peanut roasting procedures to confirm that they're heating the peanut sufficiently to kill *Salmonella* before it's further processed into butter.

And this particular company that was implicated has become an industry leader in developing and applying best food safety practices for peanut butter production and is often referred to as the model that companies should go to for processing peanut butter.

Another large company was involved in a ground turkey related outbreak which was caused by *Salmonella heidelberg*, 136 cases. And this company took a creative approach and established in further testing its raw material, its raw turkey meat before it's further ground to determine if it has one *Salmonella* or less in it.

If it has one *Salmonella* or less per gram then it passes and they can further process that. If it has more than that, that product is then diverted and cooked and it's taken - it's basically taken out of the raw system so that it's leading to a lower prevalence of high level contaminated product in the market. And there's presumptive evidence now showing that this is having an impact on reducing human cases.

Who would have guessed that *E. coli* 0157 could be associated with raw cookie dough but it was and there were 72 cases. And the company that was implicated in this outbreak now uses pasteurized flour for making cookie dough.

And it was thought based on the best information that was available in the outbreak investigation that flour was the likely source of the *E. coli* 0157 and as a result of this outbreak most companies that make raw cookie dough today now make cookie dough with pasteurized flour.

Spices are becoming more commonly implicated in outbreaks and there was early on an outbreak associated with 272 cases of salmonellosis in red and black ground pepper. And as a result of this, many of the mainstream spice processors are - have doubled up and are now validating and applying highly effective treatments to kill *Salmonella* in spices that they prepare.

We heard earlier from Dr. Williams caramel apples as a source of *Listeria*, 35 cases. Who would have guessed caramel apples as being a source of *Listeria* but some studies have now revealed that if we keep caramel apples refrigerated and shorten the shelf life, we're going to have a safer product. And so that's what is now being promoted.

There was an outbreak associated with rice and wheat puff cereal, 28 cases of salmonellosis. And this is a - we call it a low-water activity or dry product. And it - we've learned through this experience and some others that dry cleaning and dry-type sanitation procedures are more effective in controlling *Salmonella* in these low moisture food plants than going in with a lot of water and wet cleaning.

So this has become a widely adopted practice throughout the industry. A couple other examples, cantaloupes, *Listeria* in cantaloupes, 147 cases, 33 deaths and a miscarriage. And as a result of this *Listeria* associated outbreak, produce industry has adopted procedures for *Listeria* detection and control in their processing facilities and this includes using advanced decontamination methods and environmental testing.

Pot pies, who would have guessed pot pies to be a source of a *Salmonella* outbreak in which over 272 cases. And pot pies at that time were meant to be microwaved. And we call them ready to cook foods not ready to eat foods.

But because of this outbreak many of the manufacturers are now formulating their foods that are like pot pies to be more ready to eat type products rather than ready to cook so that the ingredients receive treatment such as a precooking that will kill the contaminants and avoid food safety issues where the consumer may improperly prepare the product.

So these are some concrete examples of how PulseNet has identified vehicles that had not been recognized as problems in foodborne outbreaks previously and how the food industry has proactively responded to prevent further problems with these types of foods.

So PulseNet is a driver toward food safety. It detects difficult to identify multistate foodborne outbreaks. It reveals contaminated foods that have not previously been associated with foodborne outbreaks and the findings have prompted the food industry to imply enhanced food safety interventions. I want to pass it back to CDC for question and answer.